

Applicant: Markku Kyytsonen
Application No.: 10/516,572
Art Unit: 3725

Claim Listing

1-8. (cancelled)

9. (currently amended) A multi-nip calender for calendering a fiber web, the calender comprising:

a first set of rolls attached to a first frame, the first set of rolls having a first roll, a last roll, and a first intermediate roll between the first roll and the last roll, a second intermediate roll between the first intermediate and roll last roll, and a third intermediate roll between the second intermediate and roll last roll;
wherein the first, the second, and third intermediate rolls lacking internal devices for loading or moving the rolls shell, and wherein the second intermediate roll being rotatable about an axis which is fixed with respect to the frame, and the first and second intermediate rolls are mounted for vertical motion on the frame;

wherein the first roll and the last roll are polymer-coated rolls each having a casing which is movable with respect to a portion fixed to the first frame, and each having an internal loading device with which the casing is movable toward the ~~the~~ [[first]] second intermediate roll, ~~the first intermediate roll being rotatable about an axis which is fixed with respect to the frame;~~ and

a plurality of roll nips is defined between the rolls of the first set of rolls, such that the rolls from the first roll to the last roll alternate between polymer-coated rolls and metal rolls, and the roll nips in the set of rolls are closed ~~so that any roll nip between the first roll and the first intermediate roll is closed~~ by moving the casing of the first roll with its internal loading device in the direction parallel to a plane extending through the set of rolls toward ~~the~~ [[s]] the [[first]] second intermediate roll, and the roll nips in the set of rolls are closed ~~so that the any roll nip between the last roll and the first intermediate roll is closed~~ by moving the casing of the last roll with its internal loading device in the direction

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parallel to the plane extending through the set of rolls towards the ~~[[first]]~~
second intermediate roll.

10. (currently amended) The multi-nip calender of claim 9 further comprising one or more ~~second~~ additional intermediate rolls, each ~~second~~ additional intermediate roll having an axis which is movable with respect to the frame, each ~~second~~ additional intermediate roll being positioned between the ~~[[first]]~~ second intermediate roll and the first roll or between the ~~[[first]]~~ second intermediate roll and the last roll.

11. (currently amended) The multi-nip calender of claim 10, in which said each second additional intermediate roll, and the first intermediate roll and third intermediate roll has equipment for lightening its weight, ~~and wherein the first roll and the last roll internal loading devices allow deviations caused by the own gravity of the said rolls to be compensated in the deflection of the said rolls.~~

12. (currently amended) The multi-nip calender of claim 10 in which ~~[[the]]~~ a linear load distribution of the roll nips in the set of rolls is controlled by an additional load brought to the first and/or last roll in the set of rolls, wherein:

the additional load of the first roll in the set of rolls is used for influencing the linear loads of the roll nips of the second intermediate rolls between the first intermediate roll and the last roll to a substantially lesser extent than the linear loads of the roll nips between the first intermediate roll and the first roll; and the additional load of the last roll in the set of rolls is used for influencing the linear loads of the roll nips of the second intermediate rolls between the first intermediate roll and the first roll to a substantially lesser extent than the linear loads of the roll nips between the first intermediate roll and the last roll.

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13. (currently amended) The multi-nip calender of claim 12 wherein the additional load is brought to the first and/or last roll in the set of rolls using a loading element outside [[the]] said roll.

14. (previously presented) The multi-nip calender of claim 13 wherein the loading element is a roll.

15. (currently amended) The multi-nip calender of claim 12 wherein the additional load is brought to the first and/or last roll in the set of rolls using the internal loading device of [[the]] said first and/or last roll.

16. (currently amended) The multi-nip calender of claim 9, wherein the first roll and/or the last roll are shoe rolls, in which the internal loading device comprises one or several shoe elements located under the casing of the roll, at the place of the roll nip, which can be loaded with liquid so that the casing of the said shoe roll moves in relation to the [[first]] second intermediate roll in the set of rolls.

17. (previously presented) The multi-nip calender of claim 16, wherein each shoe roll has two or several shoe elements for moving the casing of the roll and for profiling the fiber web.

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18. (withdrawn and amended) The multi-nip calender of claim 9 further comprising a second set of rolls mounted to a second frame after the first set of rolls, the second set of rolls comprising:

a second roll set first roll;

a second roll set last roll;

a second roll set first intermediate roll between the second roll set first roll and the second roll set last roll, wherein the second roll set first roll and last roll are polymer-coated rolls each having a casing which is movable with respect to a portion fixed to the second frame, and each having an internal loading device with which the casing is movable toward the second roll set first intermediate roll, the second roll set first intermediate roll being rotatable about an axis which is fixed with respect to the second frame; and

a plurality of roll nips is defined between the rolls of the second set of rolls, such that the rolls from the second roll set first roll to the second roll set last roll alternate between polymer-coated rolls and metal rolls, and the [[the]] roll nips in the second set of rolls are closed so that any roll nip between the second roll set first roll and the second roll set first intermediate roll is closed by moving the casing of the second roll set first roll with its internal loading device in the direction parallel to a plane extending through the second set of rolls towards the second roll set first intermediate roll, and so that the any roll nip between the second roll set last roll and the second roll set first intermediate roll is closed by moving the casing of the second roll set last roll with its internal loading device in the direction parallel to the plane extending through the second set of rolls towards the second roll set first intermediate roll.

19. (withdrawn) The multi-nip calender of claim 18 wherein the first frame and the second frame are a single frame.

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20. (withdrawn) The multi-nip calender of claim 18 wherein the first frame and the second frame are different frames.

21. (currently amended) A multi-nip calender for calendering a fiber web, the calender comprising:

a frame;

~~a first intermediate roll which is rotatable about an axis which is fixed with respect to the frame;~~

a first roll which is a polymer-coated roll having a casing which is movable with respect to a portion fixed to the frame, and the first roll having an internal loading device with which the casing is movable toward the first intermediate roll;

a last roll which is a polymer-coated roll having a casing which is movable with respect to a portion fixed to the frame, the last roll having an internal loading device with which the casing is movable toward the intermediate roll, wherein the first intermediate roll is positioned between the first roll and the last roll;

a first intermediate roll position on the frame between the first roll and the last roll;

a second intermediate roll position on the frame between the first intermediate roll and the last roll;

a third intermediate roll position on the frame between the second intermediate roll and the last roll;

wherein the first, the second, and third intermediate rolls lacking internal devices for loading or moving the rolls shell, and wherein the second intermediate roll is rigidly mounted to the frame, and the first and second intermediate rolls are mounted for vertical motion on the frame;

at least one second intermediate roll positioned between the first roll and the first intermediate roll, and at least one second intermediate roll positioned between

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the first intermediate roll and the last roll, each second intermediate roll having an axis which is movable with respect to the frame; and
a plurality of roll nips defined between the rolls such that the rolls from the first roll to the last roll alternate between polymer-coated rolls and metal rolls, and the roll nips are closed so that the roll nips between the first roll and the first intermediate roll are closed by moving the casing of the first roll with its internal loading device in the direction towards the first intermediate roll, and so that the roll nips between the last roll and the first intermediate roll are closed by moving the casing of the last roll with its internal loading device in the direction towards the first intermediate roll.